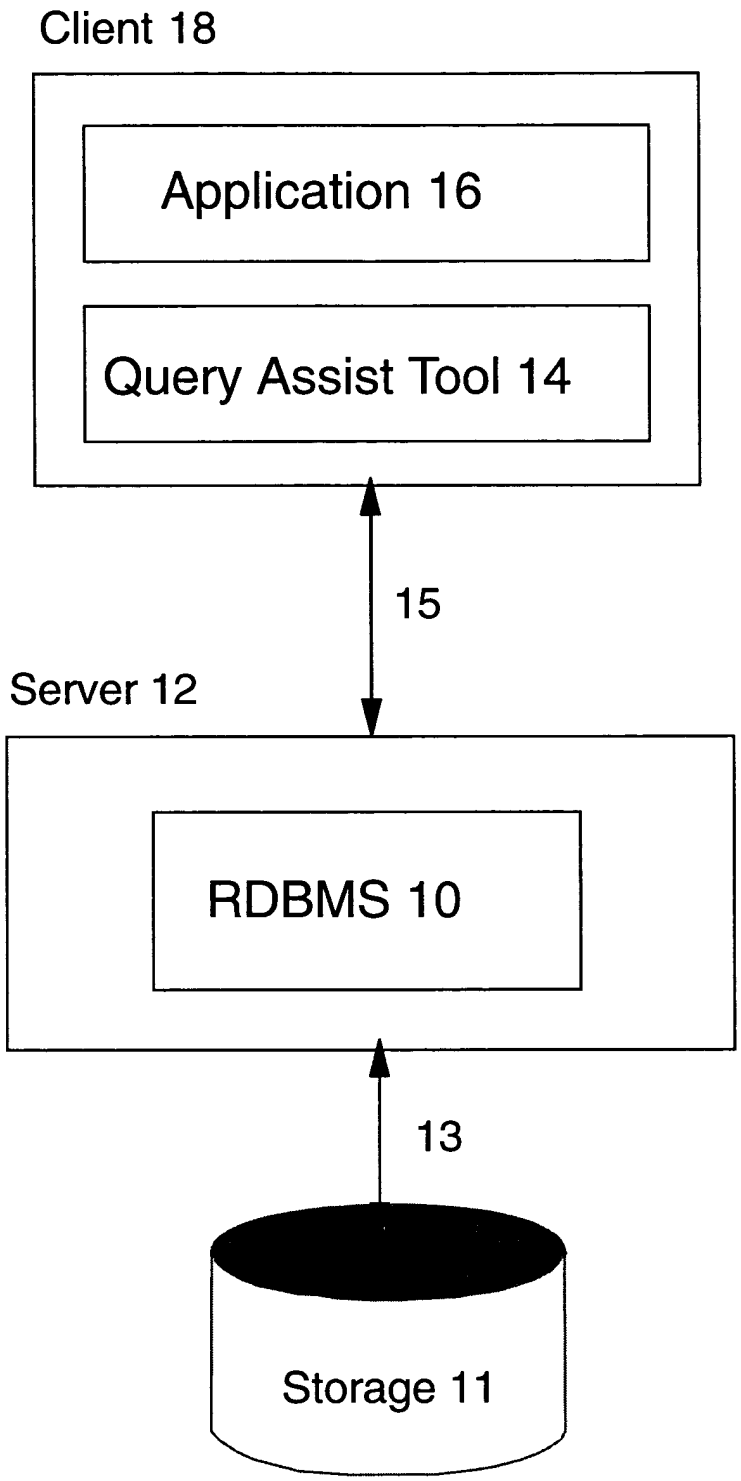

Client 18
Application 16
Query Assist Tool 14
15
Server 12
RDBMS 10
13
Storage 11

Fig. 1

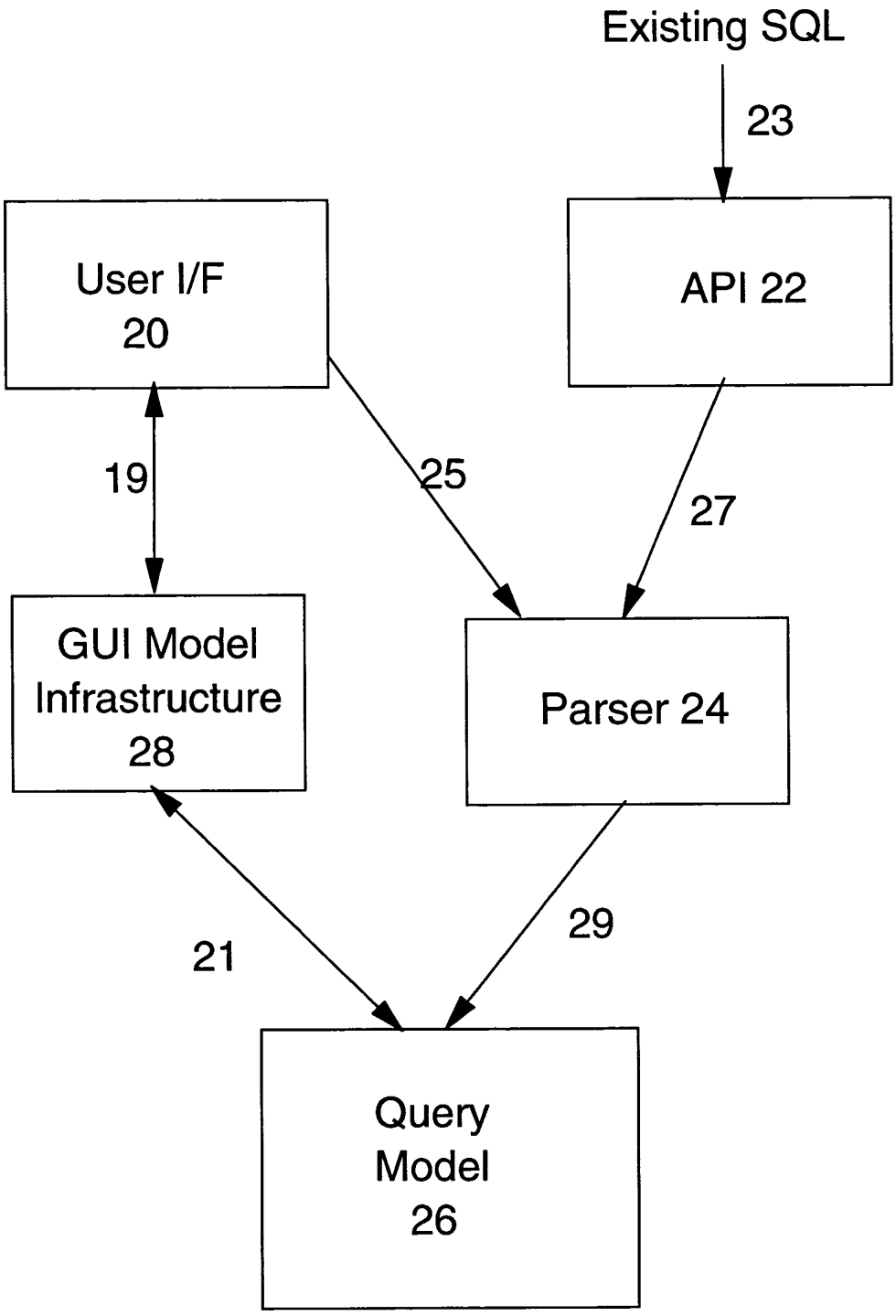

Existing SQL
23
User I/F
20
API 22
19
25
27
GUI Model
Infrastructure
28
Parser 24
21
29
Query
Model
26

Fig. 2

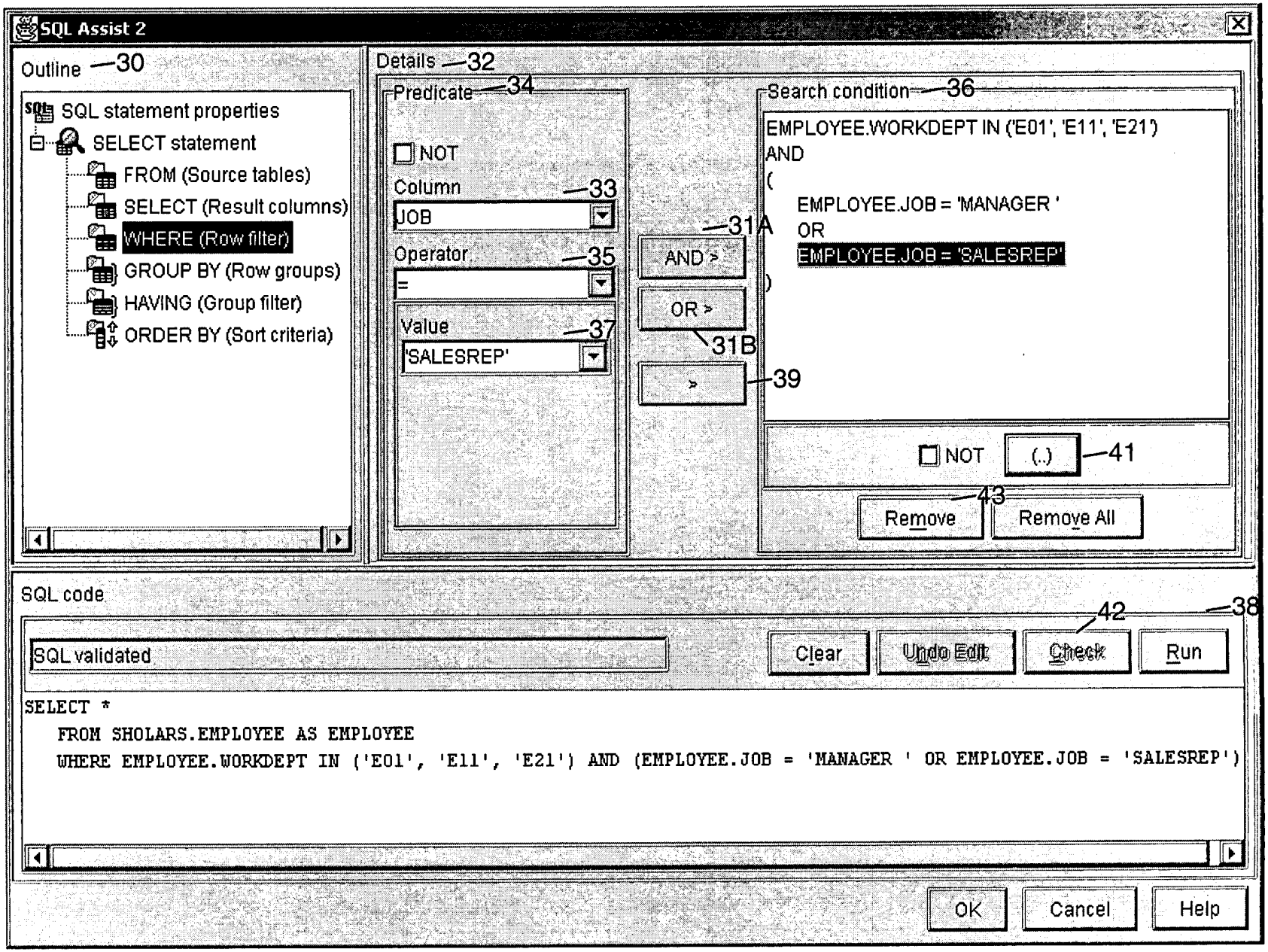

SQL Assist 2
Outline 30
SQL statement properties
SELECT statement
FROM (Source tables)
SELECT (Result columns)
WHERE (Row filter)
GROUP BY (Row groups)
HAVING (Group filter)
ORDER BY (Sort criteria)
Details 32
Predicate 34
NOT
Column 33
JOB
Operator 35
=
Value 37
'SALESREP'
31A
AND >
OR >
31B
> 39
Search condition 36
EMPLOYEE.WORKDEPT IN ('E01', 'E11', 'E21')
AND
(
EMPLOYEE.JOB = 'MANAGER '
OR
EMPLOYEE.JOB = 'SALESREP'
)
NOT
(..) 41
Remove 43
Remove All
SQL code
38
42
SQL validated
Clear
Undo Edit
Check
Run
SELECT *
FROM SHOLARS.EMPLOYEE AS EMPLOYEE
WHERE EMPLOYEE.WORKDEPT IN ('E01', 'E11', 'E21') AND (EMPLOYEE.JOB = 'MANAGER ' OR EMPLOYEE.JOB = 'SALESREP')
OK
Cancel
Help

Fig. 3A

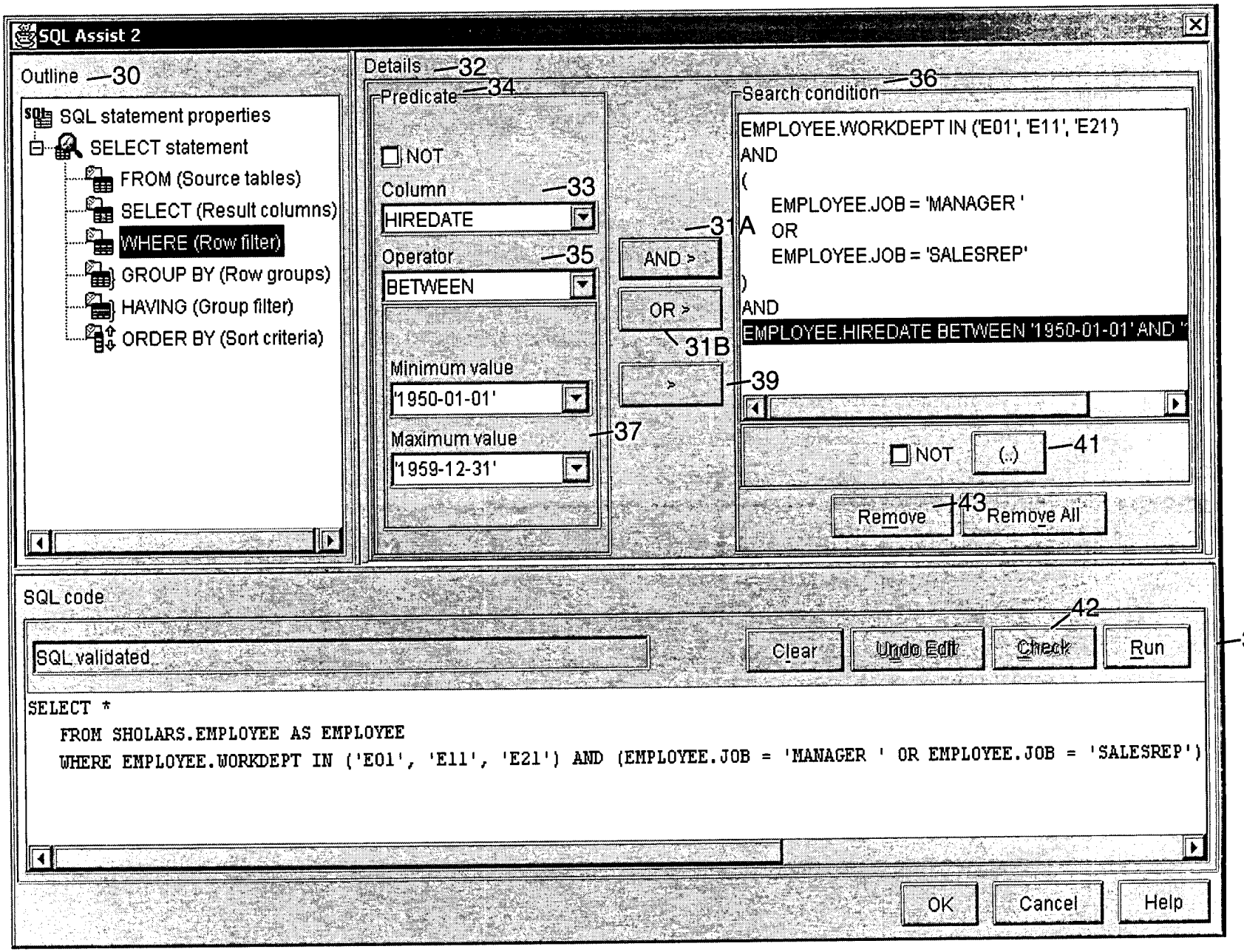

SQL Assist 2
Outline 30
SQL statement properties
SELECT statement
FROM (Source tables)
SELECT (Result columns)
WHERE (Row filter)
GROUP BY (Row groups)
HAVING (Group filter)
ORDER BY (Sort criteria)
Details 32
Predicate 34
NOT
Column 33
HIREDATE
Operator 35
BETWEEN
Minimum value
'1950-01-01'
Maximum value 37
'1959-12-31'
31
AND >
OR >
31B
>
39
Search condition 36
EMPLOYEE.WORKDEPT IN ('E01', 'E11', 'E21')
AND
(
EMPLOYEE.JOB = 'MANAGER '
OR
EMPLOYEE.JOB = 'SALESREP'
)
AND
EMPLOYEE.HIREDATE BETWEEN '1950-01-01' AND ''
A
NOT
(..)
41
Remove
43
Remove All
SQL code
SQL validated
42
Clear
Undo Edit
Check
Run
38
SELECT *
FROM SHOLARS.EMPLOYEE AS EMPLOYEE
WHERE EMPLOYEE.WORKDEPT IN ('E01', 'E11', 'E21') AND (EMPLOYEE.JOB = 'MANAGER ' OR EMPLOYEE.JOB = 'SALESREP')
OK
Cancel
Help

Fig. 3B

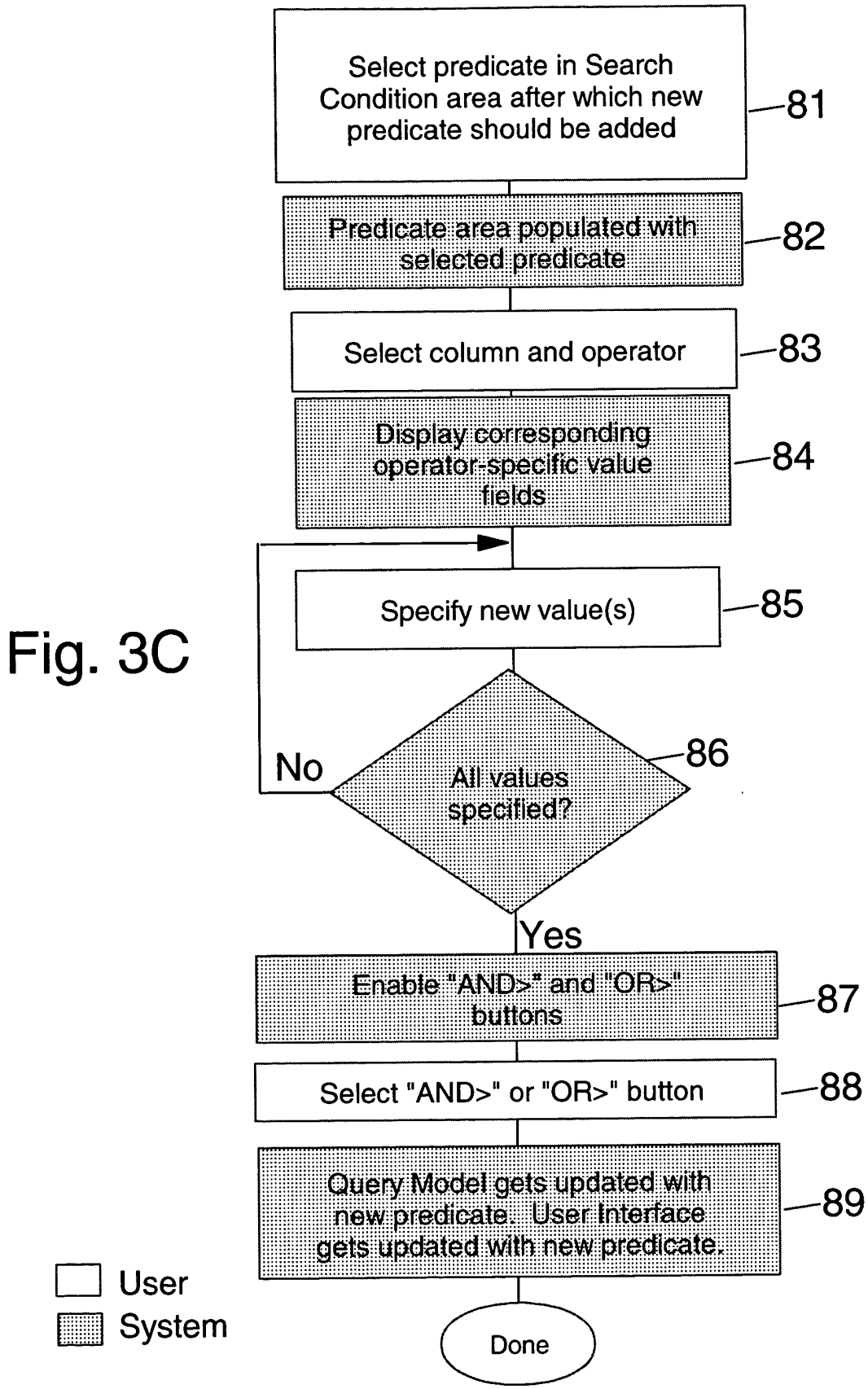

Select predicate in Search Condition area after which new predicate should be added
81
Predicate area populated with selected predicate
82
Select column and operator
83
Display corresponding operator-specific value fields
84
Specify new value(s)
85
All values specified?
86
No
Yes
Enable "AND>" and "OR>" buttons
87
Select "AND>" or "OR>" button
88
Query Model gets updated with new predicate. User Interface gets updated with new predicate.
89
Done
User
System

Fig. 3C

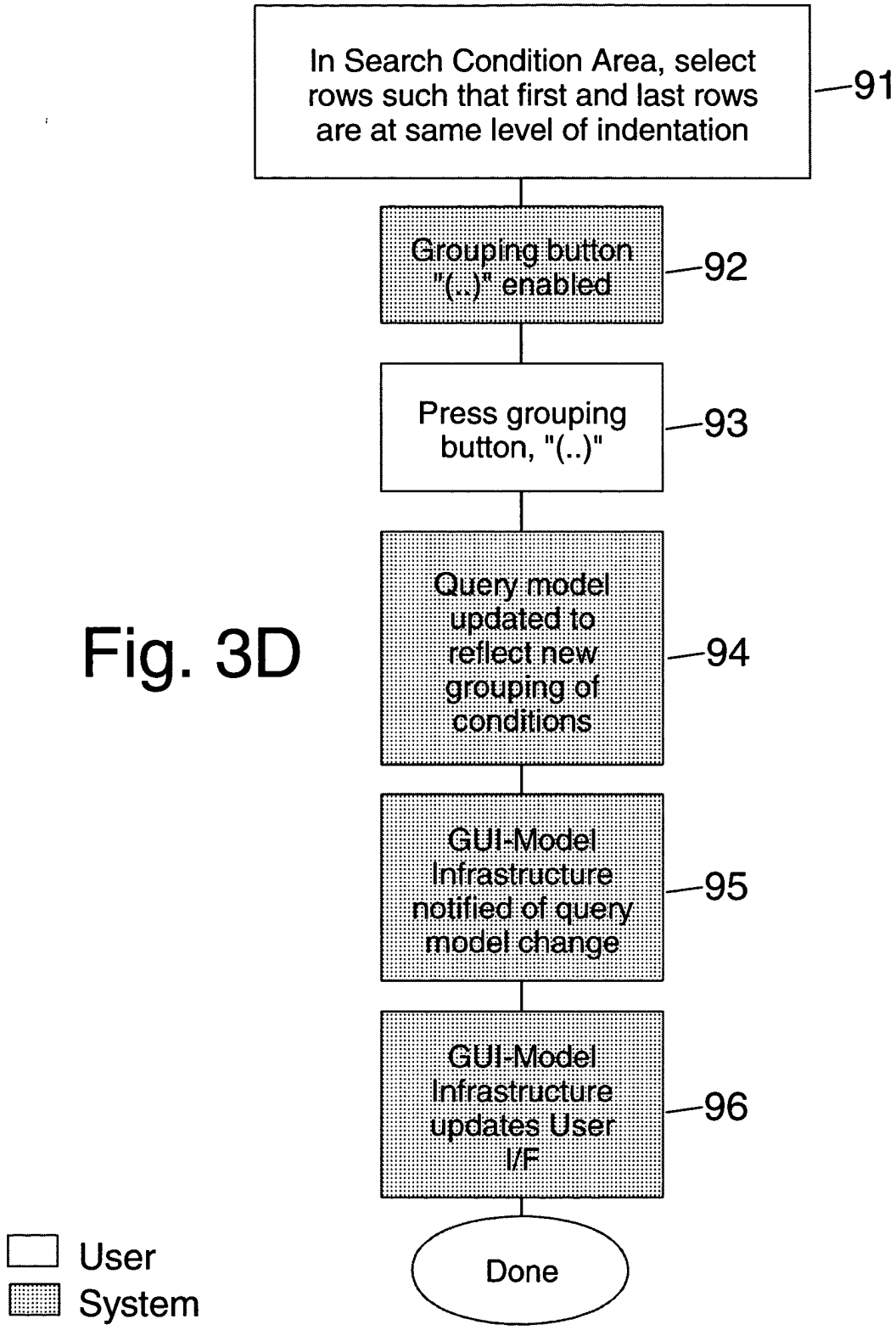

In Search Condition Area, select rows such that first and last rows are at same level of indentation
91
Grouping button "(..)" enabled
92
Press grouping button, "(..)"
93
Query model updated to reflect new grouping of conditions
94
GUI-Model Infrastructure notified of query model change
95
GUI-Model Infrastructure updates User I/F
96
Done
User
System

Fig. 3D

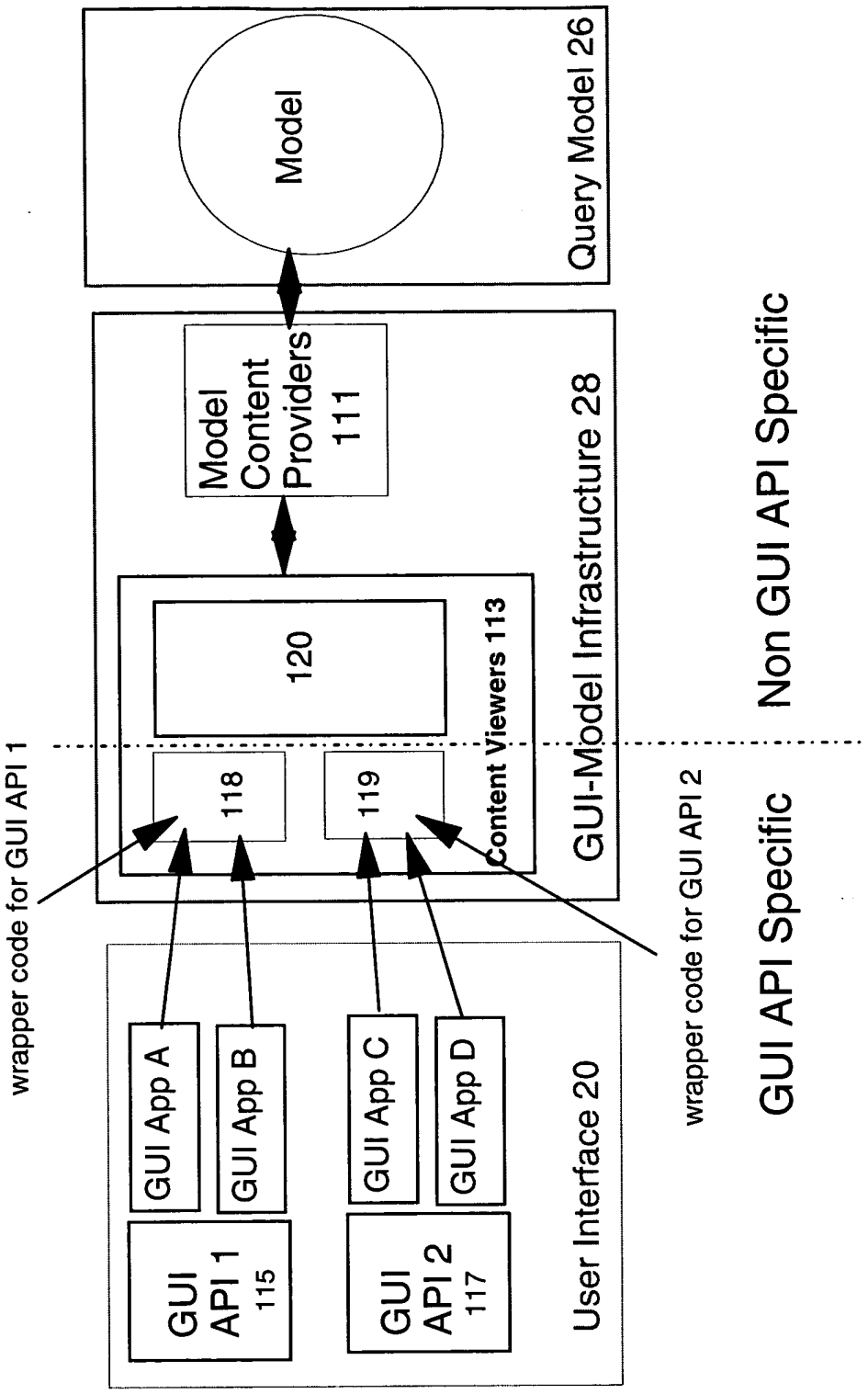

Query Model 26
Model
Model Content Providers 111
GUI-Model Infrastructure 28
120
Content Viewers 113
118
119
wrapper code for GUI API 1
wrapper code for GUI API 2
GUI App A
GUI App B
GUI App C
GUI App D
GUI API 1 115
GUI API 2 117
User Interface 20
GUI API Specific
Non GUI API Specific

Fig. 4

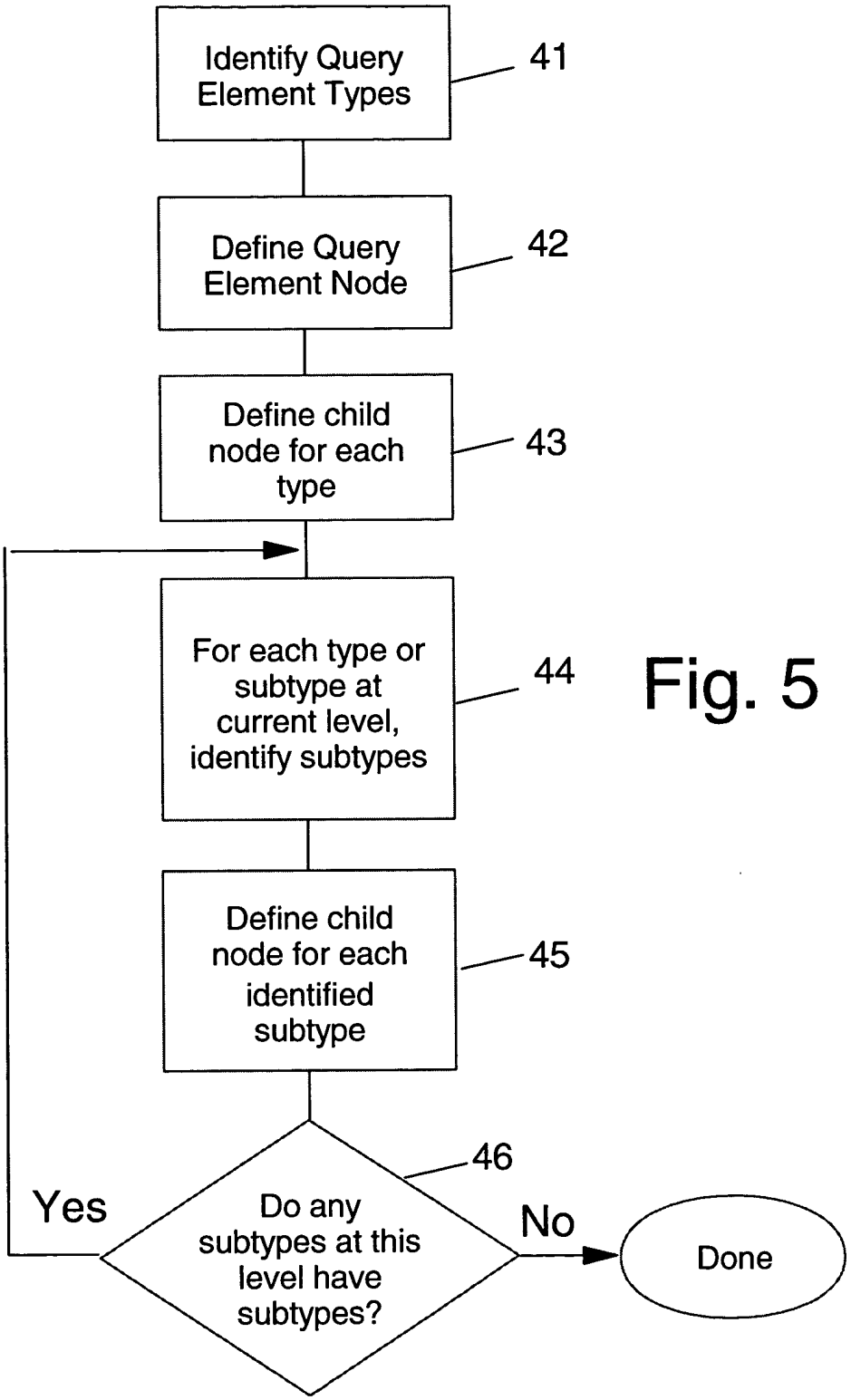

Identify Query Element Types
41
Define Query Element Node
42
Define child node for each type
43
For each type or subtype at current level, identify subtypes
44
Define child node for each identified subtype
45
Do any subtypes at this level have subtypes?
46
Yes
No
Done

Fig. 5

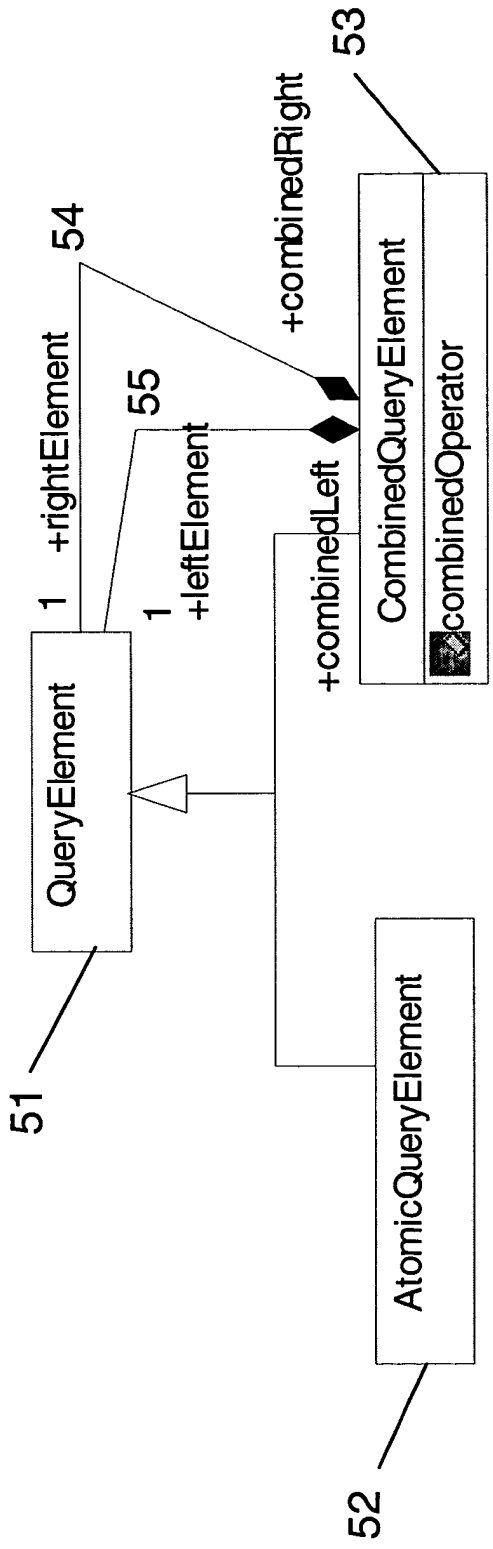

QueryElement
AtomicQueryElement
CombinedQueryElement
combinedOperator
+rightElement
+leftElement
+combinedRight
+combinedLeft
1
1
51
52
53
54
55

Fig. 6A

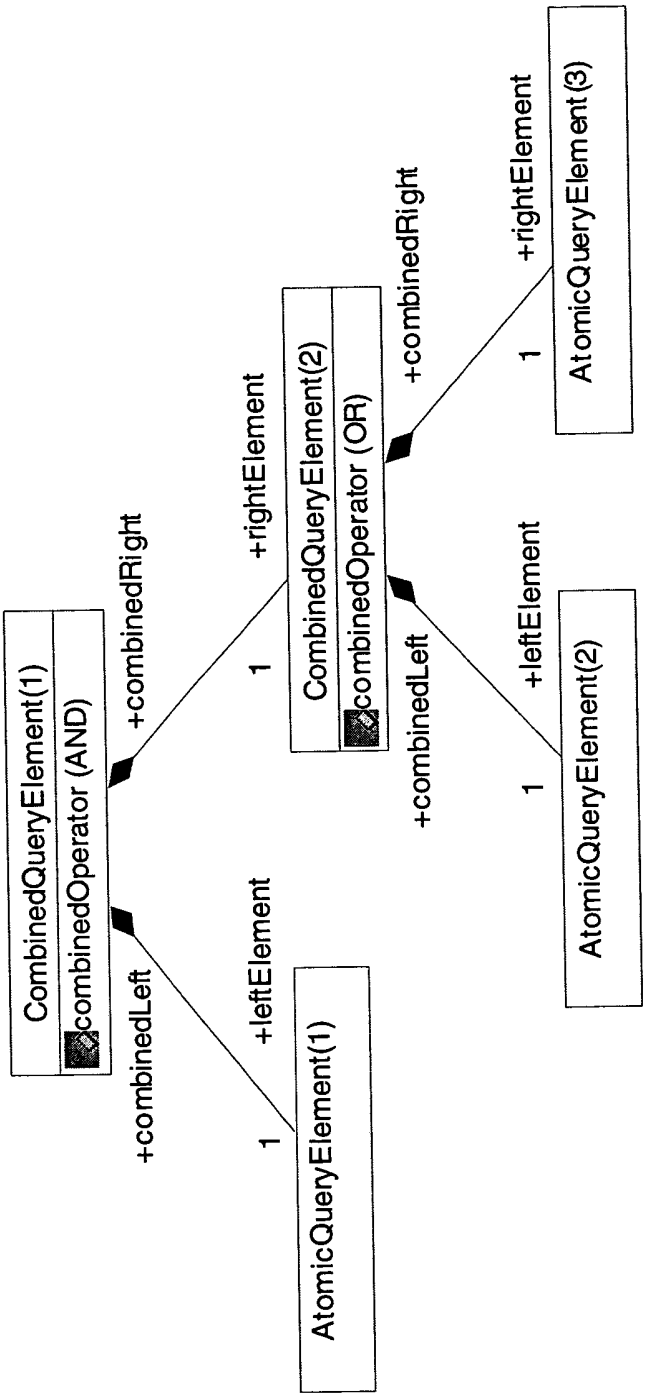

CombinedQueryElement(1)
combinedOperator (AND)
+combinedRight
+combinedLeft
+leftElement
+rightElement
1
1
CombinedQueryElement(2)
combinedOperator (OR)
+combinedRight
+combinedLeft
+leftElement
+rightElement
1
1
AtomicQueryElement(1)
AtomicQueryElement(2)
AtomicQueryElement(3)

Fig. 6B

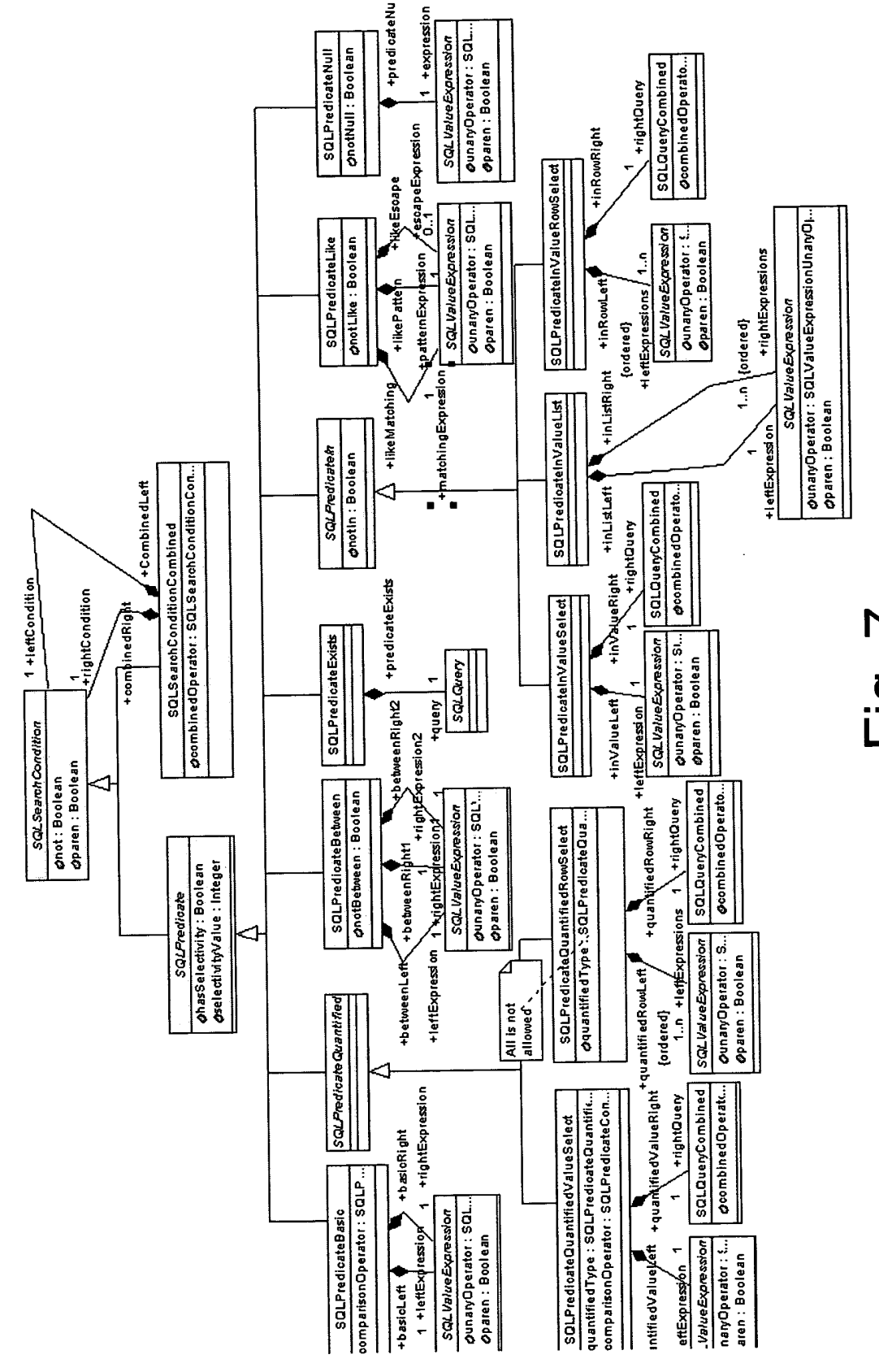

SQLSearchCondition
SQLPredicate
SQLSearchConditionCombined
SQLPredicateBasic
SQLPredicateQuantified
SQLPredicateBetween
SQLPredicateExists
SQLPredicateIn
SQLPredicateLike
SQLPredicateNull
SQLPredicateInValueList
SQLPredicateInValueRowSelect
SQLPredicateQuantifiedValueSelect
SQLPredicateQuantifiedRowSelect
SQLValueExpression
SQLQuery
SQLQueryCombined
All is not allowed

Fig. 7

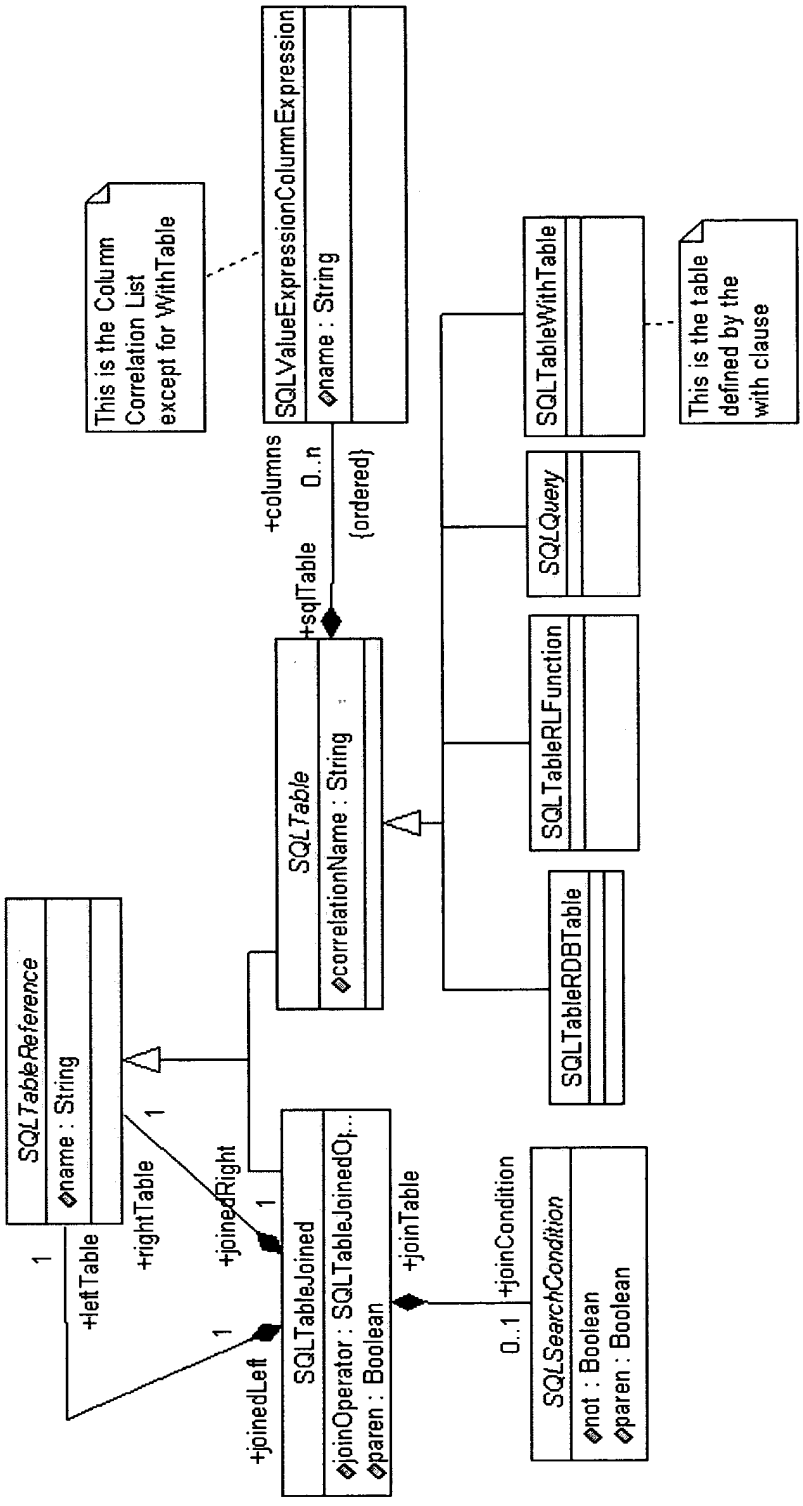

This is the Column Correlation List except for WithTable
SQLValueExpressionColumnExpression
◆name : String
+columns
0..n
{ordered}
+sqlTable
SQLTable
◆correlationName : String
SQLTableWithTable
This is the table defined by the with clause
SQLQuery
SQLTableRLFunction
SQLTableRDBTable
SQLTableReference
◆name : String
1
+leftTable
+rightTable
1
+joinedRight
1
+joinedLeft
1
SQLTableJoined
◆joinOperator : SQLTableJoinedOp...
◆paren : Boolean
+joinTable
0..1
+joinCondition
SQLSearchCondition
◆not : Boolean
◆paren : Boolean

Fig. 8

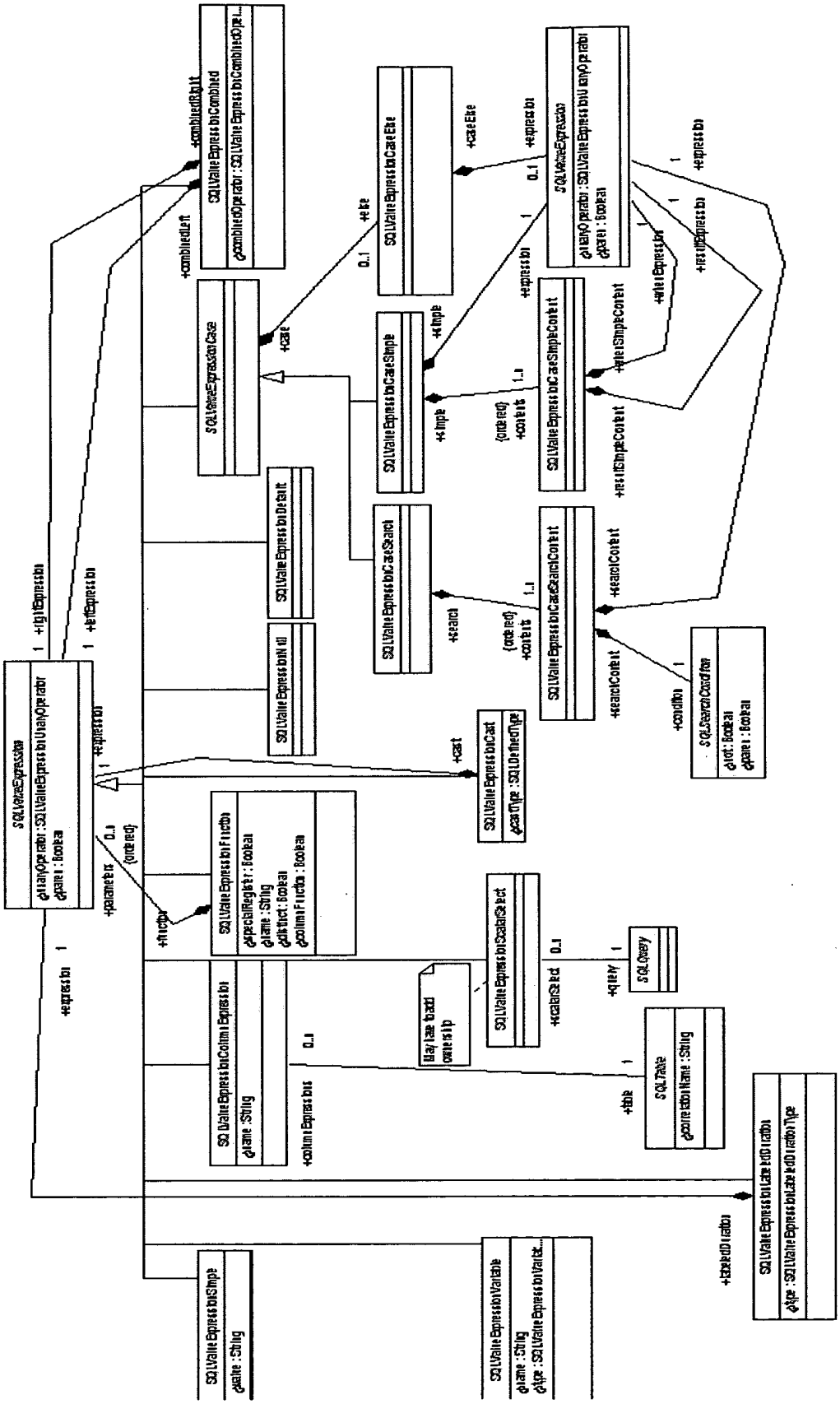
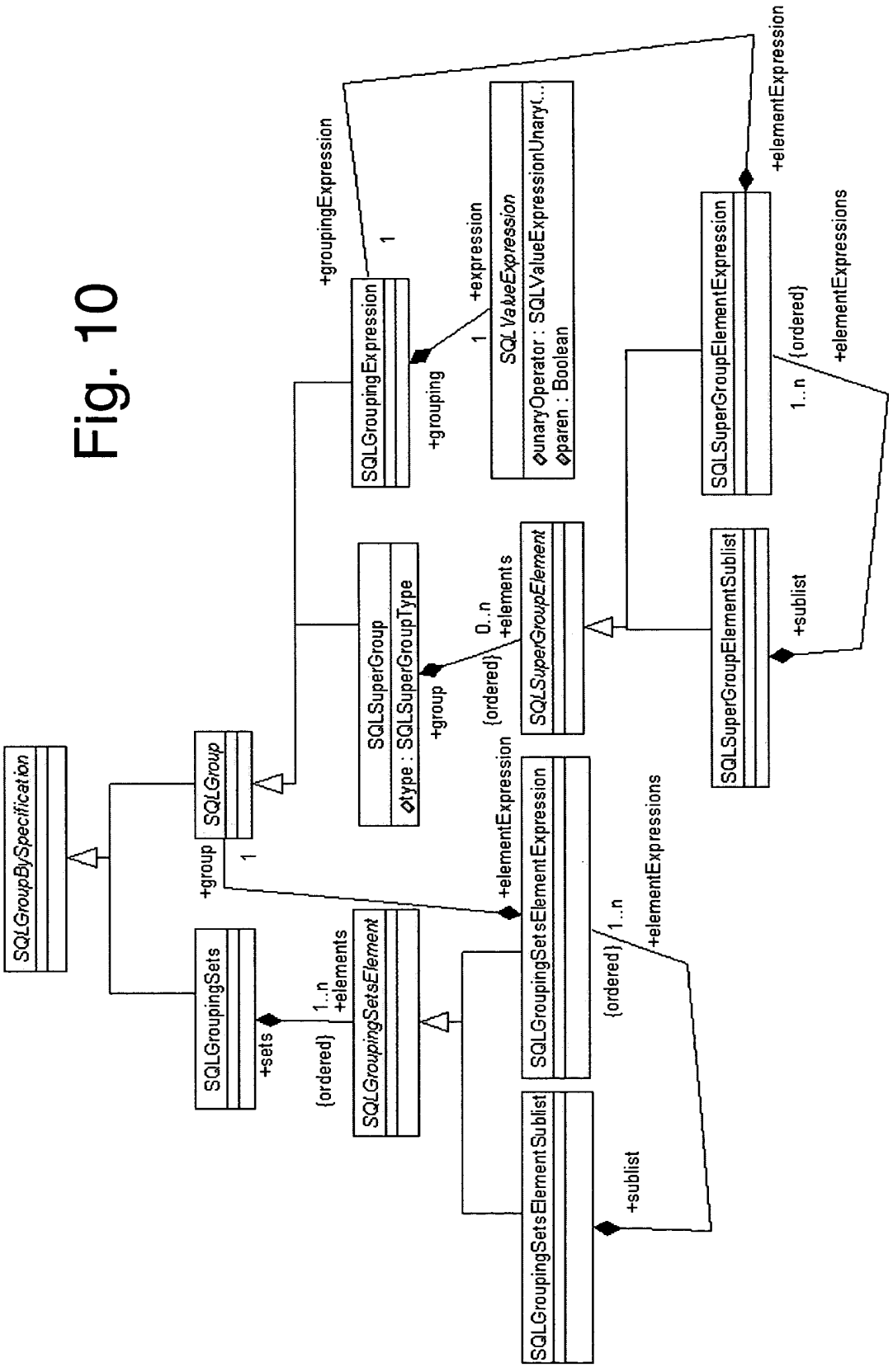


Fig. 9

Fig. 10


SQLGroupBySpecification
SQLGroup
SQLGroupingSets
+group
1
+sets
{ordered}
1..n
+elements
SQLGroupingSetsElement
SQLGroupingExpression
+grouping
+groupingExpression
1
SQLValueExpression
◊unaryOperator : SQLValueExpressionUnary(...
◊paren : Boolean
+expression
1
SQLSuperGroup
◊type : SQLSuperGroupType
+group
{ordered}
0..n
+elements
SQLSuperGroupElement
+elementExpression
SQLGroupingSetsElement
SQLGroupingSetsElementSublist
+sublist
{ordered}
1..n
+elementExpressions
SQLSuperGroupElementExpression
SQLSuperGroupElementSublist
+elementExpression
1..n
{ordered}
+elementExpressions
+sublist

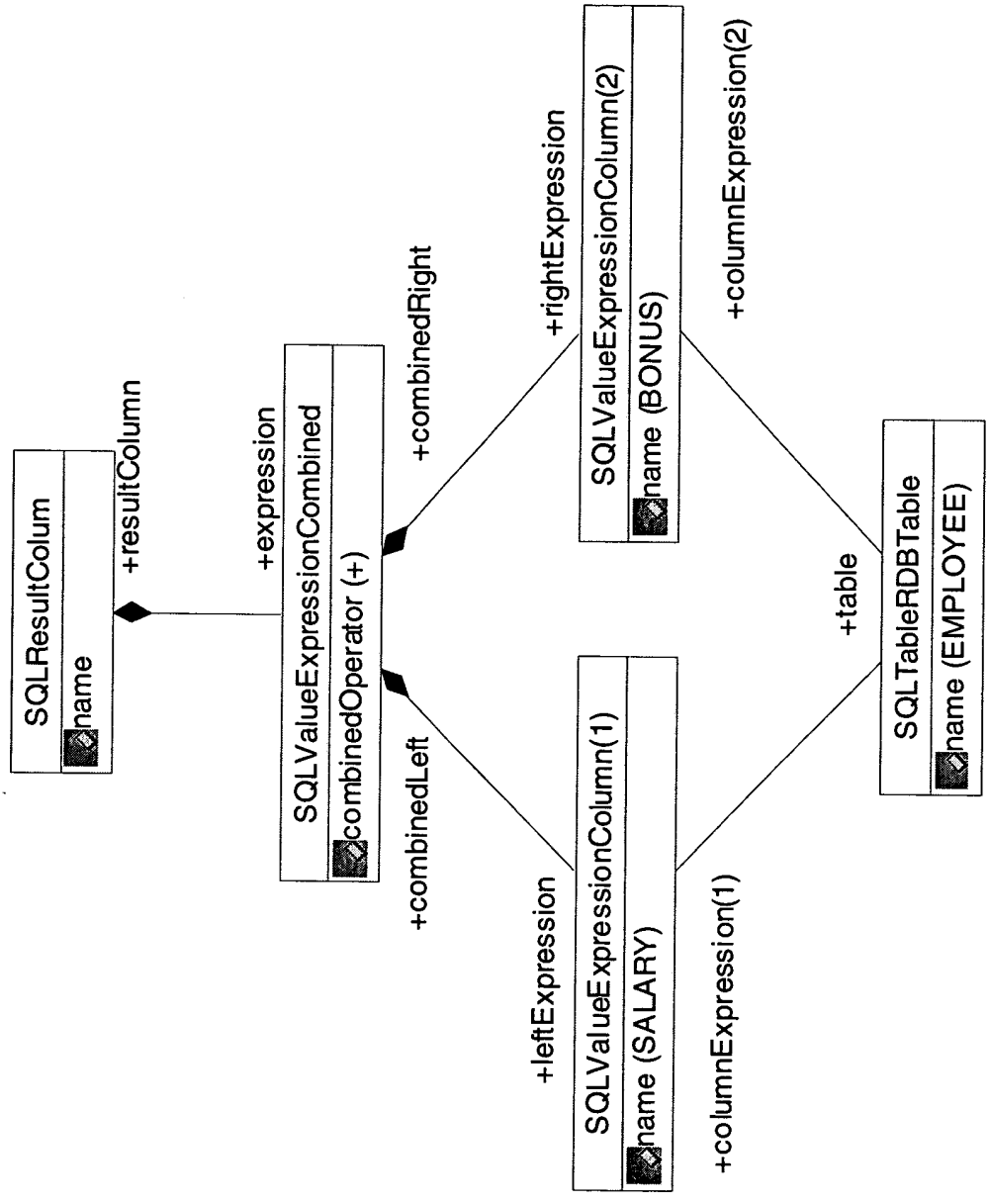

SQLResultColum
name
+resultColumn
+expression
SQLValueExpressionCombined
combinedOperator (+)
+combinedRight
+combinedLeft
+rightExpression
+leftExpression
SQLValueExpressionColumn(2)
name (BONUS)
SQLValueExpressionColumn(1)
name (SALARY)
+columnExpression(2)
+columnExpression(1)
+table
SQLTableRDBTable
name (EMPLOYEE)

Fig. 11

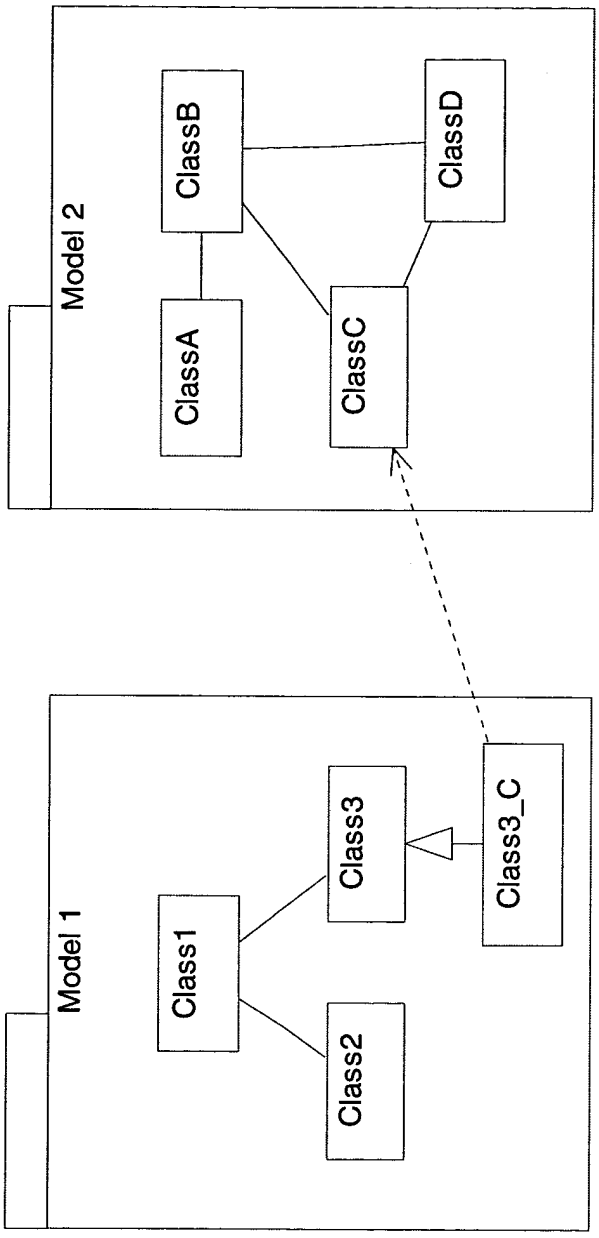

Model 2
ClassB
ClassD
ClassA
ClassC
Model 1
Class3
Class3_C
Class1
Class2

Fig. 12